The Open Public Health Journal
DOI: 10.2174/0118749445281386231227094640, 2024, 17, e18749445281386
ISSN: 1874-9445

RESEARCH ARTICLE **OPEN ACCESS**

Factors Predicting Safe Motorcyclist Riding Behaviors among Thai Undergraduates

Phankam Tanaporn[1], Benjakul Sarunya[1,*] and Kengganpanich Mondha[1]

[1]*Department of Health Education and Behavioral Sciences, Faculty of Public Health, Mahidol University, Bangkok 10400, Thailand*

Abstract:

Background: Despite the nationwide enforcement strategies in place to prevent road accidents, including wearing a helmet, not riding a motorcycle while drunk, using a safe motorcycle, obtaining a motorcycle license and avoiding speeding, accidents still occur, particularly among young motorcyclists.

Objectives: The study aimed to describe the level of behaviors and factors affecting safe motorcyclists' riding behaviors.

Methods: The cross-sectional study with single-stage cluster sampling was conducted to select 326 students in years 1–4 of the 1st semester of every faculty at Phranakhon Si Ayutthaya Rajabhat University. Data were collected using online self-administered questionnaires from December 2022 to January 2023. Descriptive and inferential statistics, including the Chi-square test, Pearson correlation coefficient and Stepwise multiple regression analysis, were used to analyze the data.

Results: Most respondents had safe motorcyclist riding behaviors at a safe level (54.6%), good knowledge-related traffic rules (41.1%), a positive attitude towards behaviors (67.8%) and a high level of support from influencing groups as subjective norms on behaviors including family members (69.6%), friends (58.3%) and favorite celebrities who participated in a road safety campaign (48.4%). Most had high perceived behavioral control (53.1%) and behavioral intention (64.7%). Eight factors were significantly associated with safe motorcyclist riding behaviors: student's year, having a motorcycle driving license, driving a motorcycle after alcohol drinking, attitude towards behaviors, subjective norms concerning behaviors, perceived behavioral control, and behavioral intention. Based on the results, four factors could significantly predict safe motorcyclist riding behaviors up to 45.6% (Nagelkerke R^2 = 0.456, $p < 0.001$) composed of perceived behavioral control, having a motorcycle driving license, behavioral intention and subjective norm influenced by friends.

Conclusion: The study could provide valuable input for institutional administrators and related organizations to formulate policies promoting safe riding behaviors among motorcyclist students. Additionally, these results may be beneficial in organizing awareness-raising campaigns to prevent motorcycle-related accidents and monitor the process of acquiring a motorcycle driving license.

Keywords: Safe motorcyclist riding behaviors, Theory of planned behavior (TPB), Factors predicting, Undergraduates students, Road accidents, Deaths.

*Address correspondence to this author at the Department of Health Education and Behavioral Sciences, Faculty of Public Health, Mahidol University, Bangkok 10400, Thailand; E-mail: sarunya.ben@mahidol.ac.th

Cite as: Tanaporn P, Sarunya B, Mondha K. Factors Predicting Safe Motorcyclist Riding Behaviors among Thai Undergraduates . Open Public Health J, 2024; 17: e18749445281386.
http://dx.doi.org/10.2174/0118749445281386231227094640

Received: September 28, 2023
Revised: December 04, 2023
Accepted: December 13, 2023
Published: January 16, 2024

1. INTRODUCTION

In 2018, road accidents were found to be the 8th leading cause of death among the world's population, whereas 1.35 million deaths were found annually. Most involved children and young adults were aged 5 to 29 years old [1]. Loss from road accidents has driven road accident prevention programs in many countries through the Global Ministerial Conference on Road Safety [2]. Additionally, the World Health Organization (WHO) has declared a Decade of Action for Road Safety from 2011 to 2020, intending to reduce road accident fatalities by 50% in 2020. However, this goal has yet to be accomplished [3]. Since 2020, WHO has called on member states to implement continuous road accident prevention programs in line with Target 3.6 of the Sustainable Development Goals (SDGs), aiming to halve the number of global deaths and injuries from road traffic accidents by 2030 [4].

In Thailand, despite efforts to improve road safety during the Decade of Action for Road Safety [5], the number of deaths due to road accidents decreased by 10% from 30.4 per 100,000 population in 2019 to 27.2 per 100,000 population in 2020. Most fatalities involved males aged 20 to 24 due to motorcycle riding accidents [6]. Considering specific areas of Thailand classified by Health Regions (13 units), Health Region 4 was the top 5 ranking over the past three years, from 2019 to 2021. Amidst all eight provinces in Health Region 4, Phranakhon Si Ayutthaya Province was the top 3-ranked with the highest number of road accident fatalities among people aged 20 to 24 riding motorcycles during the duration mentioned [7]. The road accident victims in Phranakhon Si Ayuttaya Province were primarily higher education students aged 18 to 22 who used motorcycles as their primary vehicle because the largest university was located in the central area of ancient historical sites, and most roads were narrow [8, 9]. From 2019 to 2021, 79 cases of motorcycle accidents and eight deaths were reported. Causes included crashing with a car (35.0%), high-speed riding (24.0%), failure to wear a helmet (22.0%) and riding a motorcycle in a reverse direction (19.0%) [10].

The comprehensive enforcement strategy for preventing road accidents included wearing a helmet, not riding a motorcycle while drunk, having a safe motorcycle, having a motorcycle license and riding within the speed limit [11]. These measures were developed based on the concept that road accidents are caused by people's behaviors [12]. Related research has revealed that most studies emphasized specific causes of road accidents, particularly in helmet use behavior [13-18]. Few studies have applied the health behavioral theory [15, 17]. Theories can guide in identifying the influential factors of a particular person and provide information to understand behaviors and behavioral change [19]. The Theory of Planned Behavior (TPB), developed by Ajzen [20], is one of the most applied theories in the social and behavioral sciences. TPB was intended to predict and explain a wide range of intentions and health behaviors, composed of four core components: attitude, subjective norms, perceived behavioral control (PBC) and behavioral intention (BI) [21].

Therefore, this study applied TPB as a research conceptual framework to study behaviors and factors predicting safe motorcyclist riding among university students in Phranakhon Si Ayutthaya Province. According to TPB, students' safe motorcyclist riding behavior depends on their attitudes and subjective norms influenced by family members, friends and their favorite group of superstars or celebrities participating in a road safety campaign, PBC and BI. These factors together can affect the target behaviors: safe motorcyclist riding behavior. The study's findings can be beneficial for planning the prevention and promotion program to enhance students' safe motorcyclist riding behaviors.

2. MATERIALS AND METHODS

2.1. Study Design

The cross-sectional survey research was conducted from December 2022 to January 2023.

2.2. Setting

The largest university is in Phranakhon Si Ayutthaya Province, the ancient capital city of Thailand.

2.3. Study Population and Sampling Strategies

Four thousand two hundred twenty-four male and female students enrolled in 1 to 4 undergraduate classes in the first semester of the 2022 academic year were included in the study population [22]. The sample size of 326 was derived from calculating the infinite population proportion formula [23] because the information concerning the number of students who have owned motorcycles has yet to be available. Based on the formula, the proportion of students' safe motorcyclist riding behavior (p) was 0.74 [24], the error (d) was 0.05, and alpha was 0.05. The sample size was added to 10% to compensate for nonresponse. The single-stage cluster sampling was used for selecting the respondents. Four strata of the population were involved in following the four faculties in the university. The students were grouped in four substrata in line with the class year in each stratum. Proportional to size (PPS) was applied to select sampled students in each faculty and class year stratum. Lastly, systematic random sampling was performed.

2.4. Measurement

A researcher developed a self-administered TPB-based questionnaire to collect data. The outcome and explanatory variables are detailed below.

2.4.1. Outcome Variables

The 15close–ended questions of safe motorcyclist riding behavior during the past seven days covered five aspects: wearing a helmet, not being drunk while riding a motorcycle, having a safe motorcycle, having a motorcycle license and riding within the speed limit. Each question had five options, ranging from never or not at all (0) to every time (4) for positive questions and vice versa. The total score ranged from 0 to 60, and higher scores indicated safer motorcyclist riding behavior.

2.4.2. Explanatory Variables

The questionnaire concerning the explanatory variables was divided into six sections based on the construct of TPB, except the first two sections. The first section included general characteristics (14 items): The subjects were asked to complete questions regarding demographics, motorcyclist riding behavior and motorcycle riding accidents in the past years. The second section covered knowledge-related traffic rules (18 items). Each question had three options: correct, incorrect and uncertain. A score of 0 (zero) was awarded for incorrect or uncertain answers, and a score of 1 for correct answers. Total scores ranged from 0 to 18, and higher scores indicated good knowledge of traffic rules.

The remaining sections focus on attitudes toward safe motorcyclist riding behavior (15 items), subjective norms, the perceived support from an important person comprising family members, friends and their favorite group of superstars or celebrities participating in a road safety campaign (18 items), PBC over safe motorcyclist riding behavior refers to the perception of their ability to successfully perform a safe motorcyclist riding behavior, whether dealing with an easy or difficult situation (17 items) and the intention to perform safe motorcyclist riding behavior (15-items). Each question, based on the TPB construct, used a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree) for positive items and vice versa. Higher scores of attitudes, subjective norms, PBC, and intention indicated a positive attitude toward safe motorcyclist riding behavior, a greater perception of important persons influencing safe motorcyclist riding behavior, a higher perceived ability to ride the motorcycle safely, and a stronger intention toward the target behavior, respectively.

The questionnaire was reviewed by three behavioral science experts. The Item content validity index (I-CVI) and the Scale-level content-validity index (S-CVI) met acceptable criteria. The questionnaire was pilot tested with 30 students who had identical characteristics to the study participants. Internal consistency reliability for knowledge-related traffic rules was checked using Kuder-Richardson (KR-20) and yielded a value of 0.868. Attitudes, subjective norms, PBC, intention and safe riding behaviors were measured using a Cronbach's alpha coefficient, with reliability values of 0.787, 0.949, 0.932, 0.941 and 0.875, respectively. It took an average of 20 minutes to complete the question.

2.5. Data Collection

The researcher collected data once weekly from December 19, 2022, to January 13, 2023. Respondents were scheduled during appointments to provide information. The researcher introduced herself, explained the research objectives, obtained permission, ensured sample protection, collected written consent forms and provided questionnaire details. Respondents accessed the online questionnaire *via* projectors displaying a QR code.

2.6. Statistical Analyses

The responses were downloaded from Google Forms, managed with MS Excel, and then transferred to SPSS (Version 18.0, copyright of Mahidol University) for analysis. Descriptive statistics were used to describe the respondents' characteristics. Bivariate analysis using Chi-square tests and Pearson correlation coefficient were employed to select the candidate variables in multivariate analysis. To ensure statistical significance, a two-tailed test was employed at a threshold of 0.05. Stepwise multiple regression was used to identify predictor variables of safe motorcyclist riding behavior. The following basic assumptions of multiple regression analysis were evaluated [25]. The outlier data were identified using the absolute value of the studentized residual (SRE) ≥2. The independence of residuals was detected using the Durbin-Watson statistic with a value between 1.5 to 2.5, the multicollinearity diagnostic was detected by a variance inflation factor (VIF) with a value below 5, and the normality distributed residuals analyzing in the P-P Plot. The scatter plot confirmed the homoscedasticity of the residuals. (Suppl.file)

3. RESULTS

The research findings were divided into two parts. The first part described the general characteristics of respondents, while the second presented the factors predicting safe motorcyclist riding behavior. Bivariate statistics analysis was used to present the results of factors associated with safe motorcyclist riding behavior, and then the significant variables were assigned to multivariate analysis.

3.1. General Characteristics of Respondents

Of the 326 respondents, responding to the survey, 57.4% were female, and 69.3% were 18 to 20 years old. The average age was 20.0 years. Totally, 26.1% were in the third-year class, 75.8% earned less than 85.4 USD monthly with an average of 81.7 USD, 57.7% resided in their own house or with relatives, and 69.6% resided within one to ten kilometers from the university, with an average of 10.2 kilometers.

Regarding motorcycle riding, 32.2% of the respondents rode a motorcycle daily, followed by 22.1%, often rode (5 to 6 days weekly). 29.1% had 1 to 2 years of experience riding a motorcycle, with an average of 4.4 years. Altogether, 51.5% rode with the aim of convenience to get around, and 81.3% had no motorcycle driving license. Totally, 13.2% experienced accidents over the past year. In comparison, 72.1% had experienced one accident. The first three causes of accidents were damaged road conditions (55.8%), followed by slippery roads (48.8%), high-speed riding (27.9%), and not wearing a helmet (27.9%). The least common cause of accidents was riding a motorcycle after alcohol drinking (2.3%). The study found that 41.1% of respondents had a good knowledge level of traffic rules. Based on the findings related to TPB's construct, respondents had a positive attitude towards safe motorcyclist riding (67.8%) and a

high level of subjective norms in all three groups: family members (69.6%), friends (58.3%) and favorite celebrities who participated in a road safety campaign (48.4%). Additionally, most respondents had PBC and had intention regarding safe motorcyclist riding at a high level (53.1 and 64.7%, respectively). In all, 54.6% of respondents had safe motorcyclist riding behavior at the safety level.

3.2. Predicting Factors of Safe Motorcyclist Riding Behaviors

Bivariate analysis found that 8 of 17 variables were significantly associated with safe motorcyclist riding behaviors. These variables include year class (p=0.018), having a motorcycle's license (p=0.003) (Table **1**), attitudes toward safe motorcyclist riding behaviors (r = 0.322, p <0.001), subjective norms from family (r = 0.457, p <0.001), friends (r = 0.490, p <0.001), and favorite celebrities who participated in a road safety campaign (r = 0.490, p <0.001) and behavior intention towards safe motorcyclist riding behaviors (r = 0.568, p <0.001) (Table **2**).

The study used stepwise multiple regression analysis to identify the four variables that explain 44.7% of safe motorcyclist riding behaviors. These variables ranked in descending order of coefficient towards safe motorcyclist riding behaviors (β), comprised behavior intention, having a motorcycle license, PBC and subjective norms by friends' influence (Table **3**).

Table 1. Association between the categorial variable and the level of safe motorcyclist riding behaviors using the Chi-square test (n=326).

General Characteristic	Overall	Safe Motorcyclist Riding Behaviors			χ^2	df	p-value
		Not Safe	Fairly Safe	Safe			
Sex	-	-	-	-	1.597	2	0.450
Male	139 (42.6)	17 (12.2)	48 (34.5)	74 (53.3)	-	-	-
Female	187 (57.4)	15 (8.0)	68 (36.4)	104 (55.6)	-	-	-
Year	-	-	-	-	15.253	6	**0.018**
1st year	82 (25.2)	10 (12.2)	22 (26.8)	50 (61.0)	-	-	-
2nd year	81 (24.8)	10 (12.3)	37 (45.7)	34 (42.0)	-	-	-
3rd year	85 (26.1)	6 (7.1)	37 (43.5)	42 (49.4)	-	-	-
4th year	78 (23.9)	6 (7.7)	20 (25.6)	52 (66.7)	-	-	-
Frequency of motorcycle riding (days per week)				-	6.628	6	0.357
Daily (7 days)	105 (32.2)	13 (12.4)	37 (35.2)	55 (52.4)	-	-	-
Often (5-6 days)	72 (22.1)	6 (8.3)	19 (26.4)	47 (65.3)	-	-	-
Someday (3-4 days)	49 (15.0)	3 (6.1)	22 (44.9)	24 (49.0)	-	-	-
Rarely (1-2 days)	100 (30.7)	10 (10.0)	38 (38.0)	52 (52.0)	-	-	-
Having a motorcycle license *				-	-	-	**0.003**
No	265 (81.3)	32 (12.1)	99 (37.4)	134 (50.6)	-	-	-
Yes	61 (18.7)	0 (0.0)	17 (27.9)	44 (72.1)	-	-	-
Riding motorcycle after drinking alcohol					5.727	2	0.057
No	288 (88.4)	26 (9.0)	98 (34.0)	164 (56.9)	-	-	-
Yes	38 (11.6)	6 (40.0)	18 (40.0)	14 (20.0)	-	-	-
Motorcycle accidents over the past year					0.254	2	0.881
No	283 (86.8)	28 (9.9)	102 (36.0)	153 (54.1)	-	-	-
Yes	43 (13.2)	4 (9.3)	14 (32.6)	25 (58.1)	-	-	-

Table 2. Pearson's correlation coefficient (r) between the continuous variables and the motorcyclist safety riding behaviors (n=326).

Variable		r	p-value
General characteristics			
	Age (years)	- 0.034	0.541
	Monthly income (USD)	- 0.010	0.851
	Distance from house to university (kilometers)	0.052	0.347
	Experience of riding motorcycle (Years)	- 0.051	0.362
Knowledge-related traffic rules		0.097	0.082
Attitude towards motorcyclist safety riding behaviors		0.322	**<0.001**
Subjective norm, influencing motorcyclist safety riding behavior			
	Family members	0.457	**<0.001**

(Table 2) contd.....

Variable		r	p-value
	Friends	0.490	**<0.001**
	Favorite celebrities who participated in a road safety campaign	0.490	**<0.001**
PBC towards motorcyclist safety riding behaviors		0.575	**<0.001**
BI towards motorcyclist safety riding behaviors		0.568	**<0.001**

Table 3. Stepwise multiple regression results predicting safe motorcyclist riding behaviors (n = 326).

Explanatory Variables	b	β	t	p-value
Constant	13.261		5.845	< 0.001
Perceived behavioral control	0.173	0.248	3.430	0.001
Having a motorcycle license	5.848	0.268	6.436	< 0.001
Behavioral intention	0.224	0.298	4.390	< 0.001
Subjective norm, *Friends' influence*	0.254	0.141	2.395	0.017

4. DISCUSSION

Altogether, 54.6% of participants had a level of safe motorcyclist riding behavior covering five main aspects: helmet use, not being drunk while riding a motorcycle, having a safe motorcycle, having a motorcycle license and riding within the speed limit. One-half of respondents demonstrated safe riding behavior. These behaviors were caused by an average of four years of riding experience, with nearly 50% of respondents riding for five or more days weekly. Related research found that a higher number of years of riding experience equaled three years and over was a protective factor against road traffic injuries among motorcyclists [26]. In addition, having a motorcycle license influenced safe motorcyclist riding behavior. These caused the regulations regarding obtaining a motorcycle license from authorized offices of the Department of Land Transport Office, Ministry of Transport, Thailand. Respondents with a motorcycle license indicated that they passed a written examination and practiced a riding motorcycle skill test. The approach stated that they gained sufficient experience to perform safety behaviors.

The study revealed three significant variables based on a critical construct of TPB influencing safe motorcyclist riding behavior among university students. TPB states that individuals will perform a behavior if they intend to do so, and the success of the behavior depends on their intention. The critical variable influencing the safety behaviors based on the coefficient of stepwise multiple regression analysis was BI. BI refers to an individual's readiness or effort to exhibit a behavior in a favorable direction [20]. BI drove them to be determined and enthusiastic in demonstrating behavior and making an earnest effort to perform it. Therefore, individuals with a higher intention are likelier to engage in the behavior [27]. Moreover, most respondents had not experienced any accidents over the past year (86.8%). It indicated that experiences serve as a mediating variable influencing the relationship between intention and actual behavior. The past automatically triggers present behavior [28]. Most respondents also had no motorcycle license (81.3%), so they had increased vigilance and intention to drive safely to avoid accidents leading to legal consequences.

Referring to PBC, the statistically significant variable influenced safe motorcyclist riding behavior. It could be explained that most respondents drove motorcycles daily (32.2%), had an average riding experience of 4.4 years, and never drove when drunk. Consequently, they perceived they possessed the ability and sufficient skill to control the motorcycle while riding. Additionally, most rode a motorcycle for a short distance, averaging 10.2 km. The surrounding areas, from the respondent's house to the university areas, were limited to no more than 80 km per hour because Phranakhon Si Ayutthaya Province, the capital of Siam (the name before reverting to the Kingdom of Thailand) in the mid-13th century, comprised ancient historical sites [11].

A subjective norm reflects society's view of a particular behavior, whether they approve or disapprove of it [29]. The study found friends were significantly influenced by the target behavior, safe motorcyclist riding behavior ($\beta = 0.137$, $p = 0.019$). The respondents, university students with an average age of 20.0 years, spent their daily lives with friends of the same age group. They commonly acquired a sense of belonging. Therefore, friends influenced them to adopt similar behaviors, both positive and negative, such as academic performance [30], smoking [31] and alcohol consumption [32]. Knowledge-related traffic rules were not influenced by safe motorcyclist riding behavior, causing riding a motorcycle to become routine behavior.

The study's limitation was due to a specific setting, focused on the largest university in Phranakhon Si Ayutthaya Province. Although the survey used probability sampling to select the sample, the generalizability to other locations might be limited. On the other hand, the data collection approach assigned by a self-administration questionnaire was another study limitation. The respondents might have been biased in their responses to a socially acceptable question rather than being truthful. Respondents may have been distracted or rushed to finish the questionnaire due to a friend's loud chatter after completing it.

CONCLUSION

Most respondents exhibit a safe level of motorcyclist riding behavior. The possession of a motorcycle license and the fundamental construct of TPB, including PBC, subjective norms influenced by friends and BI, were all significant predictors of a motorcycle's safety riding behavior. Therefore, educational institutions should create and maintain an up-to-date registration database for their students with motorcycles and driving licenses. These institutions should also strive to make it easier for students to obtain a motorcycle license by increasing accessibility to government services within the university area. Student clubs focusing on safe motorcyclist riding behavior should be established, where students can develop their leadership skills, analyze the causes of motorcycle accidents among university students, and plan to solve the problems. These clubs should also organize multiple campaigns and activities to promote safe motorcyclist riding behaviors. The quasi-experimental research should also be conducted by designing the health education program following the predicted variables for achieving a motorcyclist's safety riding.

AUTHORS' CONTRIBUTIONS

PT wrote the initial manuscript draft, coordinated the data collection, developed the data entry system, performed statistical analysis and screened the identified citations. BS participated in the study design, supervised data cleaning and analysis, critically revised and edited the manuscript and contacted the journal. KM contributed to the manuscript review. All authors have read and approved the final version of the manuscript.

LIST OF ABBREVIATIONS

TPB	=	Theory of Planned Behavior
PBC	=	Perceived Behavioral Control
BI	=	Behavioral Intention

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The Ethics Committee on Research in Human Subjects at Mahidol University has officially approved the research proposal as document MUPH 2022-107, dated August 23, 2023.

HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All procedures performed in studies involving human participants were in accordance with the ethical standards of institutional and/or research committee and with the 1975 Declaration of Helsinki, as revised in 2013.

CONSENT FOR PUBLICATION

Informed consent was obtained from all participants.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data and supportive information are available within the article.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS

The author would like to thank all the relevant individuals contributing to the process of field data collection.

SUPPLEMENTARY MATERIALS

Supplementary material is available on the Publisher's website.

REFERENCES

[1] World Health Organization. Global status report on road safety 2018. Available from: https://www.who.int/publications/i/item/9789241 565684 (Accessed on: March 8, 2022).

[2] World Health Organization. First Global Ministerial Conference on Road Safety. Available from: https://www.who.int/publications/m/ item/first-global-ministerial-conference-on-road-safety (Accessed on: November 19, 2021).

[3] World Health Organization. Global launch: decade of action for road safety 2011-2020. Available from: https://www.who.int/groups/ united-nations-road-safety-collaboration/decade-of-action-for-road-safety-2011-2020 (Accessed on: March 8, 2022).

[4] World Health Organization. WHO kicks off a Decade of Action for Road Safety. Available from: https://www.who.int/news/item/28-10-2021-who-kicks-off-a-decade-of-action-for-road-safety (Accessed on: October 28. 2021).

[5] Chartbunchachai W. The 3th global ministerial conference on road safety, Stockholm Waterfront Congress Center, Sweden. J HEALTH Sci 2020; 29(3): 561-72.

[6] Data on road accident fatalities (from 3 databases). Available from: https://dip.ddc.moph.go.th/new/ (Accessed November 22, 2021).

[7] Situation of fatalities from road accidents in Thailand. Available from: https://dip.ddc.moph.go.th/new/3base_status_new (Accessed on: November 22, 2021).

[8] Office of the Permanent Secretary (OPS), Ministry of Higher Education, Science, Research and Innovation. Higher education plan for national manpower production and development (2021-2027). Available from: http://www.dusit.ac.th/wp-content/uploads/2020/06/ (Accessed on: December 13, 2021).

[9] Ayutthaya Studies Institute. Guide to visit ancient sites in Phranakhon Si Ayutthaya Rajabhat University. Available from: https://www.aru.ac.th/ asi/images/pdf/KM2562.pdf (Accessed on: April 7, 2021).

[10] Claims report among students at Phranakhon Si Ayutthaya Rajabhat University Nursing group. Phranakhon Si Ayuttaya Rajbhat University 2021.

[11] Road Safety Policy Foundation. Laws and measures related to motorcycles in Thailand. Laws and measures related to motorcycles in Thailand Available from: http://www.roadsafetythai.org/ (Accessed on: December 7, 2021).

[12] Department of Disaster Prevention and Mitigation. Causes of

accidents and driving according to traffic rules. Available from: http://main. bangkokideaeasy.com/file/guidecenter/file48.pdf (Accessed on: November 30, 2021).

[13] Chonsalasin D, Siridhara S, Ratanavaraha V, Jomnonkwao S, Watthanaklang D. A study of factors affecting intention of helmet use: An application of the theory of health belief model. Chonsalasin 2017; 8(1)

[14] Arif Z, Rajanikanth BR, Prasad K. The role of helmet fastening in motorcycle road traffic accidents. Craniomaxillofac Trauma Reconstr 2019; 12(4): 284-90. http://dx.doi.org/10.1055/s-0039-1685458 PMID: 31719953

[15] Konkaew K, Srijaroen W. Causal factor affecting helmet use behavior among public health students of Pibulsongkram Rajabhat University, Phitsanulok Province. J Sci Techno Mahasarak Uni 2020; 39(3): 323-33.

[16] Phacharakununya P, Vorapongsathorn S, Vorapongsathorn T, Rodjakpai Y, Chooratna K. Factors influencing safety helmet wearing behaviors to prevent accidents from motorcycle riding of students in the Institute of physical education, Chon Buri Campus. Acad J Thai Natl Sports Univ 2020; 12(2): 226-38.

[17] Cheawae S, Prateepko T, Churngchow C. Selected factors affecting helmet use behaviors for accidental prevention following health belief model of students at Yala institute of physical education. Acad J Thai Natl Sports Univ 2021; 13(3): 211-22.

[18] Umniyatun Y, Nurmansyah MI, Farradika Y, Purnama TB, Hidayat DN. Motorcycle risky behaviours and road accidents among adolescents in Jakarta metropolitan area, Indonesia. Int J Inj Contr Saf Promot 2021; 28(3): 339-46. http://dx.doi.org/10.1080/17457300.2021.1928229 PMID: 34058942

[19] Glanz K, Bishop DB. The role of behavioral science theory in the development and implementation of public health interventions. Annu Rev Public Health 2012; 21: 299-418. http://dx.doi.org/10.1146/annurev.publhealth.012809.103604 PMID: 20070207

[20] Ajzen I. The theory of planned behavior. Organ Behav Hum Decis Process 1991; 50(2): 179-211. http://dx.doi.org/10.1016/0749-5978(91)90020-T

[21] Bosnjak M, Ajzen I, Schmidt P. The theory of planned behavior: Selected recent advances and applications. Eur J Psychol 2020; 16(3): 352-6. http://dx.doi.org/10.5964/ejop.v16i3.3107 PMID: 33680187

[22] Report 2021 number of students Phranakhon Si Ayutthaya Rajabhat University. Phranakhon Si Ayutthaya Rajabhat University 2021.

[23] Wayne WD. Biostatistics: A Foundation of Analysis in the Health Sciences. (6th ed.), New York: John Wiley & Sons 1995.

[24] Thasai K, Musigappong P, Pundee R. Factor affecting risk behaviors influencing motorcycle accident among senior high school students. J Health, Saf Environ 2021; 14(1): 50-67.

[25] Testing Assumptions of Linear Regression In SPSS. Available from: https://www.statisticssolutions.com/testing-assumptions-oflinear-regression-in-spss/ (Accessed on: January 22, 2023).

[26] Tumwesigye NM, Atuyambe LM, Kobusingye OK. Factors Associated with injuries among commercial motorcyclists: Evidence from a matched case control study in Kampala City, Uganda. PLoS One 2016; 11(2): e0148511. http://dx.doi.org/10.1371/journal.pone.0148511

[27] Fishbein M, Ajzen I. Belief, attitude, intention and behavior. Reading, MA: Addison-Wesley 1975.

[28] Aarts H, Verplanken B, van Knippenberg A. Predicting behavior from actions in the past: Repeated decision making or a matter of habit. J Appl Soc Psychol 1998; 28(15): 1355-74. http://dx.doi.org/10.1111/j.1559-1816.1998.tb01681.x

[29] Ajzen I. From intentions to actions: A theory of planned behavior. Action control: from cognition to behavior. Berlin: Springer-Verlag 1985; pp. 11-39. http://dx.doi.org/10.1007/978-3-642-69746-3_2

[30] Palacios D, Berger C. Friends' influence on academic performance among early adolescents: The role of social status. Psykhe 2022; 31(1): 1-14.

[31] Lin M, Chu M, Li X, *et al*. Factors influencing adolescent experimental and current smoking behaviors based on social cognitive theory: A cross-sectional study in Xiamen. Front Public Health 2023; 11: 1093264. http://dx.doi.org/10.3389/fpubh.2023.1093264

[32] Alenazi I, Alanazi A, Alabdali M, Alanazi A, Alanazi S. Prevalence, knowledge, and attitude toward substance abuse, alcohol intake, and smoking among male high school students in Riyadh, Saudi Arabia. Cureus 2023; 15(1): e33457. http://dx.doi.org/10.7759/cureus.33457